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Part 1 – Claims Listing

1. (Previously presented) An electrosurgical generator having a virtual control panel for controlling functionality of the electrosurgical generator in response to interrogation of an object interacting with a control panel image, the virtual control panel comprising:
 - 5 a display surface structure having a display surface upon which the control panel image is located;
 - a sensor connected to the display surface structure to interrogate optically contact interaction of the object with the control panel image at a location on the display surface separated from the sensor and to supply an interaction signal
 - 10 indicative of contact interaction of the object with the control panel image; and the electrosurgical generator comprising:
 - a generator controller operative to control functionality of the electrosurgical generator, the generator controller receiving the interaction signal and controlling functionality of the electrosurgical generator in response to the interaction signal.
 - 15 2. (Canceled)
 3. (Previously presented) An electrosurgical generator as defined in claim 1, wherein the virtual control panel further comprises:
 - a projector connected to the display surface structure to project optically the control panel image on the display surface.
 4. (Original) An electrosurgical generator as defined in claim 1, wherein: the control panel image is printed and attached to the display surface.
 5. (Previously presented) An electrosurgical generator as defined in claim 1, wherein:
 - the electrosurgical generator includes an exterior housing;
 - the display surface structure is a portion of the housing; and the virtual
 - 5 control panel further comprises:
 - a projector connected to the display surface structure to project optically the control panel image on the display surface.

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6. (Previously presented) An electrosurgical generator as defined in claim 1, wherein:

the electrosurgical generator includes an exterior housing;

the display surface structure is separate from the housing; and the 5 virtual control panel further comprises:

a projector connected to the display surface structure to project optically the control panel image on the display surface.

7. (Original) An electrosurgical generator as defined in claim 6, wherein:
the display surface structure is attachable to and detachable from the housing.

8. (Previously presented) An electrosurgical generator as defined in claim 7, further comprising:

a wireless communication link operative between the virtual control panel and the electrosurgical generator to communicate the interaction signal from 5 the virtual control panel to the generator controller.

9. (Canceled)

10. (Previously presented) An electrosurgical generator as defined in claim 8, wherein:

the wireless communication link uses radio frequency electromagnetic waves to communicate the interaction signal from the virtual control panel to the 5 generator controller.

11. (Previously presented) An electrosurgical generator as defined in claim 7, wherein:

the display surface structure is sterilizable.

12. (Previously presented) An electrosurgical generator as defined in claim 11, wherein:

the display surface structure is disposable after use at a surgical site.

13. (Previously presented) An electrosurgical generator as defined in claim 1, wherein:

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the display surface structure and the sensor are sterilizable.

14. (Original) An electrosurgical generator as defined in claim 1, wherein the virtual control panel further comprises:

a projector connected to the display surface structure to project optically the control panel image on the display surface; and wherein:

- 5 the projector is sterilizable.

15. (Previously presented) An electrosurgical generator as defined in claim 14, wherein:

the display surface structure and the sensor and the projector are disposable after use at a surgical site.

16. (Previously presented) An electrosurgical generator as defined in claim 1, wherein:

the control panel image includes a contact control area and a display area, the contact control area representing control functionality of the electrosurgical 5 generator, the display area presenting information describing functionality of the electrosurgical generator; and

the sensor interrogating contact interaction of the object only within the contact control area of the control panel image.

17. (Previously presented) An electrosurgical generator as defined in claim 16, wherein the virtual control panel further comprises:

a projector connected to the display surface structure to project optically a contact control area and a display area of the control panel image on the display 5 surface, the projector further projecting optically information describing functionality of the electrosurgical generator in the display area of the control panel image.

18. (Previously presented) An electrosurgical generator as defined in claim 17, wherein:

the projector is connected to the generator controller to receive information signals supplied from the generator controller;

- 5 the generator controller supplies information signals to the projector indicative of the information describing functionality of the generator; and

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the projector responds to the information signals to project the information describing functionality of the electrosurgical generator in the display area of the control panel image.

19. (Previously presented) An electrosurgical generator as defined in claim 17, wherein:

the control panel image includes a plurality of different contact control areas each of which represents a different control function of the electrosurgical 5 generator;

the sensor optically interrogates contact interaction of the object with each of the different contact control areas and generates the interaction signal related to the contact interaction of the object with each of the contact control areas; and

the generator controller responds to the interaction signal to control the 10 functionality of the electrosurgical generator in accordance with the control function interrogated by contact interaction of the object with the corresponding contact control area.

20. (Previously presented) An electrosurgical generator as defined in claim 17, wherein:

the control panel image includes a plurality of different contact control areas each of which represents a different control function of the electrosurgical 5 generator;

the sensor interrogates contact interaction of the object with each of the different contact control areas and generates the interaction signal related to contact interaction of the object with each of the contact control areas; and

the generator controller responds to each of the different interaction 10 signals to control functionality of the electrosurgical generator in accordance with the control function interrogated by contact interaction of the object with the corresponding contact control area.

21. (Canceled)

22. (Previously presented) An electrosurgical generator as defined in claim 1, wherein the virtual control panel further comprises:

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a projector connected to the display surface structure to project optically a plurality of different contact control areas of the control panel image on the display 5 surface, each contact control area representing a different control function of the electrosurgical generator; and wherein:

the sensor comprises a light source which scans a transmitted light beam over the contact control areas of the control panel image, and a light receptor sensor which receives a received light beam created by reflection of the transmitted 10 light beam from the object upon contact interaction with each contact control area; and the virtual control panel further comprises:

a device controller connected to the light source and the light receptor sensor, the device controller operatively controlling the light source to scan the transmitted light beam over the contact control areas at a predetermined scanning 15 angle at each instance of time, and the device controller operatively determining the contact interaction of the object with a contact control area based on the scanning angle and the received light beam.

23. (Previously presented) An electrosurgical generator as defined in claim 22, wherein:

the light source delivers pulses of light as the transmitted light beam; the received light beam is formed by pulses of light which are time 5 shifted relative to the corresponding pulses of the transmitted light beam as a result of reflection of the transmitted light beam from the object; and

the device controller operatively determines an interaction position where the object interacts with a contact control area based on the time shift of the corresponding pulses of the transmitted and received light beams in addition to the 10 predetermined scanning angle.

24. (Previously presented) An electrosurgical generator as defined in claim 23, wherein:

the projector projects a projection light beam on the display surface to optically create the contact control areas;

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5 the device controller is operatively connected to the projector to coordinate the location where the projection light beam creates each of the contact control areas relative to the interaction position where the object contacts the contact control areas of the control panel image.

25. (Previously presented) An electrosurgical generator as defined in claim 1, further comprising:

a virtual pad in addition to the virtual control panel, the virtual pad including a pad display surface structure having a pad display surface;

5 a pad projector positioned relative to the pad display surface structure to project optically a pad control panel image on the pad display surface;

10 a pad sensor connected to the pad display surface structure to interrogate contact interaction of the object with the pad control panel image at a location on the pad display surface separated from the sensor and to supply a pad interaction signal indicative of contact interaction of the object with the pad control panel image; and wherein:

15 the generator controller is connected to receive the pad interaction signal and to control the functionality of the electrosurgical generator in response to the pad interaction signal in response to contact interaction of the object with the pad control image.

26. (Original) An electrosurgical generator as defined in claim 25, wherein:
the pad projector creates the pad control panel image with a pad contact control area and a pad display area, the pad contact control area representing control functionality of the electrosurgical generator, the pad display area presenting information describing functionality of the electrosurgical generator; and

the pad projector projecting the information describing functionality of the electrosurgical generator in the pad display area of the pad control panel image.

27. (Previously presented) An electrosurgical generator as defined in claim 26, wherein:

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the pad projector is connected to the generator controller to receive information signals supplied by the generator controller;

5 the generator controller supplies information signals to the pad projector indicative of the information describing the functionality of the generator; and

the pad projector responds to the information signals to project the information describing functionality of the electrosurgical generator in the pad display area of the pad control panel image.

28. (Previously presented) An electrosurgical generator as defined in claim 27, further comprising:

a wireless communication link connecting the virtual pad and the generator controller and operative to communicate the interaction signal and the

5 information signals between the virtual pad and the generator controller.

29. (Canceled)

30. (Canceled)

31. (Canceled)

32. (Previously presented) An electrosurgical generator as defined in claim 25, wherein the virtual pad further comprises:

a hood connected to the pad display surface structure and extending above the pad display surface for shielding the pad control panel image from ambient 5 light.

33. (Previously presented) An electrosurgical generator as defined in claim 25, wherein the virtual pad further comprises:

a base piece connected to the pad display surface structure to support the virtual pad and orient the pad display surface structure at an angle relative to a 5 horizontal reference; and

a self-contained power supply connected to one of either the base piece or the pad display surface structure for supplying power to the pad projector.

34. (Previously presented) A virtual control panel for use with an electrosurgical generator to control functionality of an electrosurgical generator in response to interrogation of an object interacting with virtual control panel, the

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electrosurgical generator including a generator controller to control the functionality of
5 the electrosurgical generator in response to control input signals, the virtual control
panel comprising:
a display surface structure having a display surface;
a control panel image on the pad display surface; and
a sensor connected to the display surface structure to interrogate
10 optically contact interaction of the object with the control panel image at a location on
the display surface separated from the sensor, the sensor creating an interaction
signal indicative of contact interaction of the object with the control panel image, the
sensor supplying the interaction signal as a control input signal to the generator
controller by which to cause the generator controller to control the functionality of the
15 electrosurgical generator in response to the contact interaction of the object with the
control panel image.

35. (Canceled)
36. (Original) A virtual control panel as defined in claim 34, wherein:
the control panel image is printed and attached to the display surface.
37. (Previously presented) A virtual control panel as defined in claim 34,
further comprising:
a projector connected to the display surface structure to project optically
the control panel image on the display surface.

38. (Previously presented) A virtual control panel as defined in claim 37,
wherein:
the control panel image projected by the projector includes a contact
control area and a display area, the contact control area representing control
5 functionality of the electrosurgical generator, and the display area presenting
information describing functionality of the electrosurgical generator;
the sensor interrogates contact interaction of the object with the contact
control area of the control panel image; and

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the projector projecting information describing functionality of the
10 electrosurgical generator in the display area of the control panel image in response to
information signals supplied by the generator controller.

39. (Original) A virtual control panel as defined in claim 38, further
comprising:

a transmitter receiver connected to the projector and sensor to
communicate wirelessly the interaction and information signals to and from the
5 generator controller.

40. (Canceled)

41. (Canceled)

42. (Previously presented) A method for controlling functionality of an
electrosurgical generator, comprising:

presenting a control panel image on a display surface of a display
surface structure;

5 including within the control panel image a contact control area which
represents a control function of the electrosurgical generator;

interacting an object by contact with the contact control area to select
functionality to be performed by the electrosurgical generator;

optically interrogating the contact control area for contact interaction by
10 the object at the display surface structure; and

controlling the functionality of the generator in response to interrogating
the contact interaction of the object with the contact control area.

43. (Original) A method as defined in claim 42, further comprising:

presenting the control panel image by optically projecting the control
panel image onto the display surface.

44. (Previously presented) A method as defined in claim 42, further
comprising:

presenting the control panel image by attaching a printed representation
of the control panel image to the display surface.

45. (Original) A method as defined in claim 42, further comprising:

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using a finger of an operator of the electrosurgical generator as the object for interacting with the control panel image.

46. (Original) A method as defined in claim 42, further comprising:

positioning the display surface structure and the display surface within a sterile field at a surgical site.

47. (Previously presented) A method as defined in claim 42, further comprising:

physically separating the display surface structure and the display surface from the electrosurgical generator;

5 positioning the display surface structure and the display surface within a sterile field at a surgical site; and

positioning the electrosurgical generator outside of the sterile field at the surgical site.

48. (Previously presented) A method as defined in claim 42, wherein the electrosurgical generator includes an exterior housing, and the method further comprises:

using a portion of the exterior housing of the electrosurgical generator
5 as the display surface structure; and

presenting the control panel image by optically projecting the control panel image onto the portion of the housing forming the display surface structure.

49. (Original) A method as defined in claim 42, wherein the electrosurgical generator includes an exterior housing, and the method further comprises:

separating the display surface structure from the housing.

50. (Previously presented) A method as defined in claim 49, further comprising:

selectively attaching the display surface structure to the housing; and
selectively detaching the display surface structure from the housing.

51. (Previously presented) A method as defined in claim 49, further comprising:

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sterilizing the display surface structure prior to controlling the functionality of the electrosurgical generator during a surgical procedure.

52. (Previously presented) A method as defined in claim 51, further comprising:

disposing of the display surface structure after controlling the functionality of the electrosurgical generator during the surgical procedure.

53. (Previously presented) A method as defined in claim 51, further comprising:

using a sensor connected to the display surface structure to optically interrogate the contact control area for contact interaction by the object; and

5 sterilizing the sensor prior to controlling the functionality of the electrosurgical generator during the surgical procedure.

54. (Previously presented) A method as defined in claim 53, further comprising:

disposing of the display surface structure and the sensor after controlling the functionality of the electrosurgical generator during the surgical
5 procedure.

55. (Previously presented) A method as defined in claim 53, further comprising:

using a projector connected to the display surface structure to present the control panel image by optically projecting the control panel image onto the
5 display surface; and

sterilizing the projector prior to controlling the functionality of the electrosurgical generator during the surgical procedure.

56. (Previously presented) A method as defined in claim 55, further comprising:

disposing of the display surface structure and the sensor and the projector after controlling the functionality of the electrosurgical generator during the
5 surgical procedure.

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57. (Previously presented) A method as defined in claim 42, further comprising:

presenting the control panel image by optically projecting the control panel image onto the display surface;

- 5 including a contact control area and a display area in the presented control panel image;

permitting control over the functionality of the electrosurgical generator by interacting the object only by contact with the contact control area; and

- 10 presenting information describing functionality of the electrosurgical generator in the display area.

58. (Previously presented) A method as defined in claim 57, further comprising:

supplying information signals from the generator controller to the virtual control panel which contain information describing the functionality of the generator;

- 5 supplying interaction signals to the generator controller from the virtual control panel to control the functionality of the generator; and

wirelessly communicating the interaction and information signals between the electrosurgical generator and the virtual control panel.

59. (Previously presented) A method as defined in claim 57, further comprising:

including in the control panel image a plurality of different contact control areas each of which represents a different control function of the

- 5 electrosurgical generator;

optically interrogating contact interaction of the object with each of the different contact control areas;

selecting different control functions of the electrosurgical generator by contact interaction of the object with the corresponding contact control areas.

60. (Previously presented) A method as defined in claim 42, further comprising:

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including in the control panel image a plurality of different contact control areas each of which represents a different control function of the

5 electrosurgical generator;

optically interrogating contact interaction of the object with each of the different contact control areas; and

selecting different control functions of the electrosurgical generator by contact interaction of the object with the corresponding contact control areas.

61. (Previously presented) A method as defined in claim 42, further comprising:

presenting the control panel image by optically projecting the control panel image onto the display surface;

5 including in the projected control panel image a plurality of different contact control areas each of which represents a different control function of the electrosurgical generator;

10 optically interrogating the contact control area for contact interaction by the object by scanning a transmitted light beam over the contact control areas of the control panel image, and by receiving a received light beam created by reflection of the transmitted light beam from the object;

controlling a predetermined scanning angle of the transmitted light beam over the contact control areas at each instance of time; and

15 interrogating the contact interaction of the object with a contact control area based on the scanning angle and the received light beam.

62. (Previously presented) A method as defined in claim 61, further comprising:

delivering pulses of light as the transmitted light beam;

5 forming the received light beam by pulses of light which are time shifted relative to the corresponding pulses of the transmitted light beam by reflection of the transmitted light beam from the object; and

determining an interaction position where the object interacts by contact with a contact control area based on the relative time shift of the corresponding

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pulses of the transmitted and received light beams in addition to the predetermined scanning angle.

63. (Previously presented) A method as defined in claim 62, further comprising:

projecting a projection light beam on the display surface to optically create the contact control areas of the control panel image on the display surface;

5 and

coordinating the location where the projection light beam creates the contact control areas relative to the interaction position where the object interacts by contact with the contact control areas of the control panel image.

64. (Previously presented) A method as defined in claim 42, further involving the use of a virtual pad in addition to the virtual control panel, the method further comprising:

optically projecting a pad control panel image on a pad display surface 5 of a pad display surface structure of the virtual pad;

including within the pad control panel image a pad contact control area which represents a control function of the electrosurgical generator;

interacting an object by contact with the pad contact control area as a designation of a selected control function to be performed by the electrosurgical 10 generator;

optically interrogating the pad contact control area for contact interaction by the object; and

controlling the functionality of the generator in response to interrogating the interaction of the object by contact with the pad contact control area and in 15 response to interrogating the interaction of the object by contact with the contact control area of the virtual control panel.

65. (Previously presented) A method as defined in claim 42, further comprising:

shielding the control panel image from being washed out by ambient light.

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66. (Canceled)
67. (Canceled)
68. (Canceled)
69. (Previously presented) An electrosurgical generator as defined in claim 13, wherein:

the display surface structure and the sensor are disposable after use at a surgical site.

70. (Previously presented) A virtual control panel as defined in claim 34 which is sterilizable.

71. (Previously presented) A virtual control panel as defined in claim 34 which is disposable after use at a surgical site.

72. (Previously presented) A virtual control panel as defined in claim 34, further comprising:

a projector connected to the display surface structure to project optically the control panel image on the display surface.